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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/506,895	09/07/2004	Ichiroh Yamasaki	900-505	5426

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EXAMINER	
HALL, ASHA J	
ART UNIT	**PAPER NUMBER**
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/506,895	YAMASAKI ET AL.	
	Examiner	Art Unit	
	ASHA HALL	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 January 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8,10 and 11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,8,10 and 11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 11 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 11 states that the partial contact between the second conductivity type semiconductor layer and the front electrode is a line. The relation of the partial contact between the second conductivity type semiconductor layer and the front electrode is described as a “line” has not been disclosed in the applicant’s specification.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 11 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 11 is rendered indefinite because it is unclear whether the line is a straight line, a curved line, lines adjacent to one another (lined up), or stacked.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 8 is rejected under 35 U.S.C. 102(b) as being anticipated by Nakai et al. (US 6,207,890).

With respect to claim 8, Nakai et al. discloses method for manufacturing a photoelectric conversion device comprising the steps of:

(a) forming a film containing second conductivity type (2) impurities on a semiconductor substrate(1) as shown in Figure 6 having convex and concave portions formed on its surface in such a manner that the film becomes thicker from the convex portion to the concave portion(col.11; lines: 5-10); and

(b) implanting second conductivity type impurities into the semiconductor substrate from the film to form a second conductivity type semiconductor layer (2) on the surface of the semiconductor substrate (1) (col.11; lines: 47-55); and

(c) forming a front electrode(8) that is in contact with the concave portion which constitute a part of the semiconductor substrate surface as shown in Figure 7 (col.11; lines: 30-44).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-6,10, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakai et al. (US 6,207,890) in view of Silva et al. (US 6,046,542).

With respect to claim 1, Nakai et al. discloses a photoelectric conversion device (col.1; lines: 6-8) using a first conductivity type semiconductor substrate (1) (col.1; lines:40-51) having convex and concave portions formed on its surface (col. 2; lines: 19-23), the device comprising (Figure 11):

- a second conductivity type semiconductor layer (3) formed on the surface of the first conductivity type semiconductor substrate (1) (col.1; lines:40-51);
- a front electrode(4) connected to the second conductivity type semiconductor layer(3) (col.3; lines: 33-39);
- a rear electrode (6) formed on the rear surface of the first conductivity type semiconductor substrate(1) (col.3; lines: 35-39),

However, Nakai et al. fails to disclose the second conductivity type semiconductor layer being partially in contact with the front electrode and becoming thinner as it goes farther from the contacted area.

Silva et al. discloses a semiconductor film (Figure 1) and further discloses a conductive tracks (35)/front electrodes that extend along the front surface (partial contact as depicted in Figure 1) of the semiconductor film(10) and transverse to the one direction to form connections the emitter/semiconductor device (col.6; lines:14-21). Silva et al. further teaches that the transverse dimensions of the conductive tracks are about 60μm to 80μm (as depicted in Figure 1 the tracks become thinner as it goes away from the contact area)(col.6:lines: 20-21). It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate conductive tracks/front electrodes as taught by Silva et al. to the photoelectric conversion device of Nakai et al. in order to connect to emitter/semiconductor device.

In respect to claim 2, modified Nakai et al. discloses the photoelectric conversion device according to claim 1, wherein the convex portions/rounded uneven portions as shown in Figure 11 of the semiconductor substrate (1) are arranged at given intervals and the second conductivity type semiconductor layer becomes (3) thinner from the convex portions to the concave portions of the substrate (1) (col.2; lines: 5-9).

With respect to claim 3, modified Nakai et al. discloses a photoelectric conversion device according to claim 2, wherein each convex portion has the front electrode (4) as shown in Figure 11 (col.1; lines: 47-48).

In regard to claim 4, modified Nakai et al. discloses the photoelectric conversion device according to claim 1, wherein the convex portions of the semiconductor substrate (1) are arranged at given intervals as shown in Figure 11, and the second conductivity type semiconductor layer (3) become thicker from the top of the convex

portions to the concave portions of the substrate (1) (Nakai et al. discloses that the second conductivity type semiconductor layer (3) being thinner on the bottom of the rounded portions, then it has been interpreted that it is thicker on the top) (col.2; lines: 5-8).

With respect to claim 5, modified Nakai et al. discloses the photoelectric conversion device according to claim 4, wherein each convex portion has the front electrode (4) (col.5; lines: 6-11) as shown in Figure 11.

In respect to claim 6, modified Nakai et al. discloses a method for manufacturing a photoelectric conversion device comprising:

(a) forming a film/a resist serving as a barrier against impurity diffusion on a semiconductor substrate(1) (col.10; lines: 34-39) having convex and concave portions formed on its surface in such a manner that the film becomes thicker/larger from the convex portion/bottom curved portion to the concave portion (col.2; lines: 53-56);

(b) implanting second conductivity type (2) impurities into the semiconductor substrate (1) through the film to form a second conductivity type semiconductor (2) layer on the surface of the semiconductor substrate (col.10; lines:50-53);

(c) forming a front electrode (8) that is in contact with the convex portion which constitutes a part of the semiconductor substrate surface (1) as shown in Figure 7 (col.11; lines: 32-34).

In regard to claim 10, modified Nakai et al. discloses the photoelectric conversion device according to claim 1, wherein the partial contact between the second conductivity type semiconductor layer (3) and the front electrode (4) is substantially a point (uneven rounded section make contact at a point) (Figure 1 & 11) (col. 13; lines: 35-44).

As to claim 11, modified Nakai et al. discloses the photoelectric conversion device according to claim 1, wherein the partial contact between the second conductivity type semiconductor layer (3) and the front electrode (4) is a line (as depicted in Figure 1).

Response to Arguments

9. Applicant's arguments filed January 8, 2008 have been fully considered and are persuasive. In regards to claims 1-6 and 8, the Applicant argues that Nakai et al. semiconductor layer (2) is not in contact with the front electrode (4).

Applicant's arguments with respect to claims 1-6 and 8 have been considered, but are moot in view of the new ground(s) of rejection. With respect to claims 1-6, a new grounds of rejections are based on Nakai et al. (US 6,207,890) in view of Silva et al. (US 6,046,542).

10. In regard to claims 6 and 8, the Applicant argues that Nakai's amophous silicon layer can be deposited in a uniform thickness and therefore there is no layer with uneven thickness formed on the surface of the semiconductor substrate.

11. The Examiner respectfully disagrees. The semiconductor layers (2,3) of Nakai et al. depicts in Figure 1 the that the film becomes thicker from the convex portion to the concave portion.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Asha Hall whose telephone number is 571-272-9812. The examiner can normally be reached on Monday-Thursday 8:30-7:00PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AJH
/A. H./
Examiner, Art Unit 1795

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1795